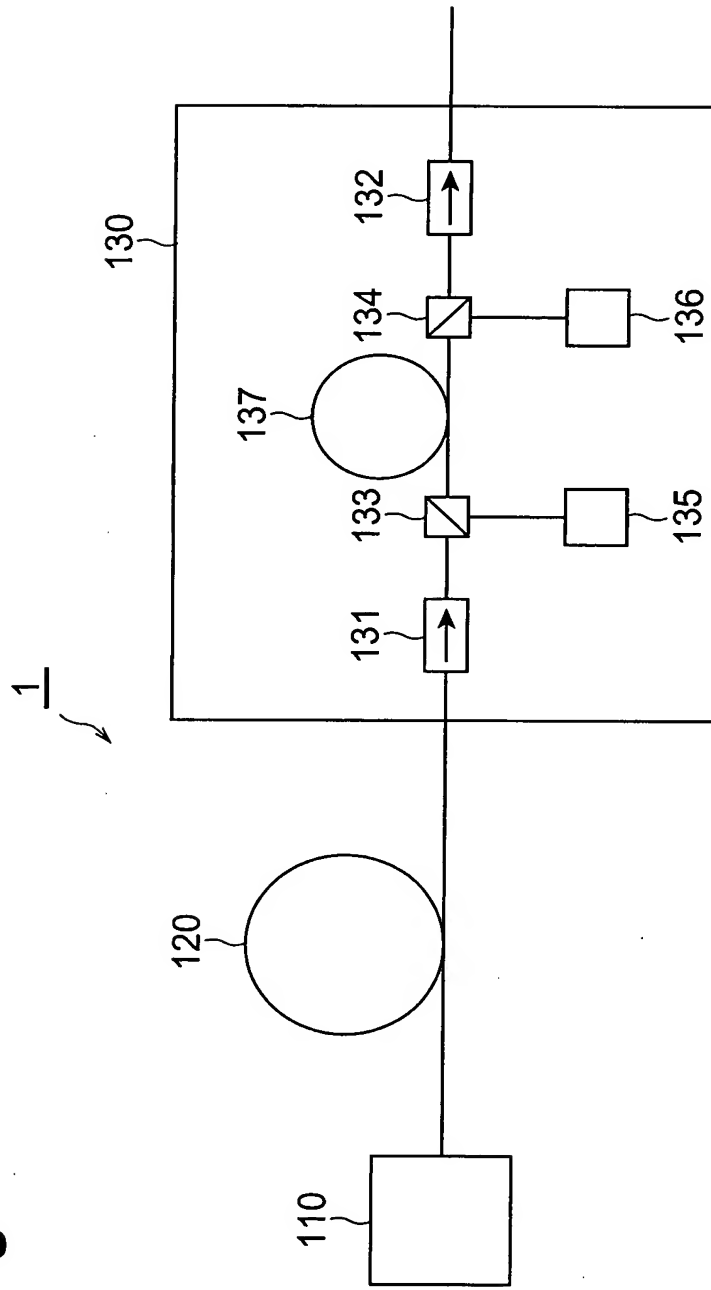
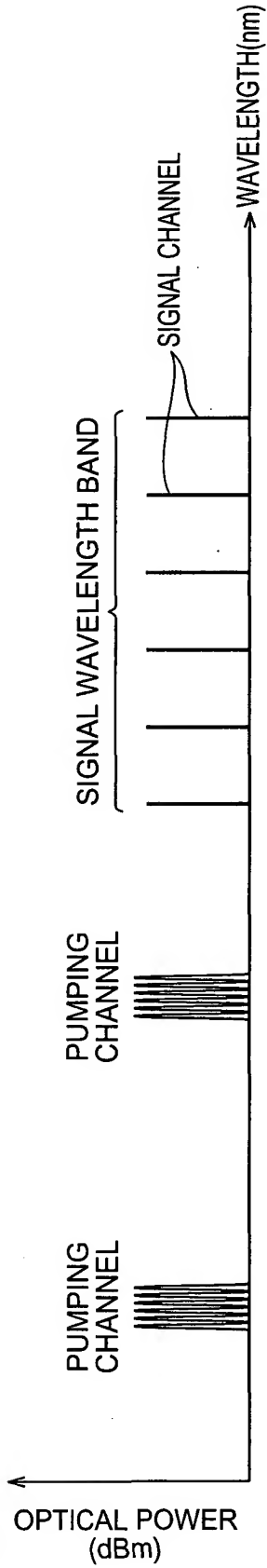


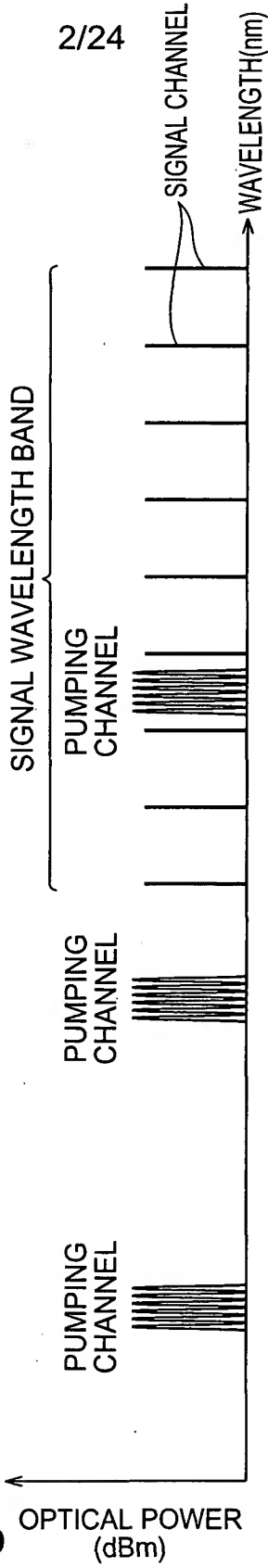
**Fig.1**



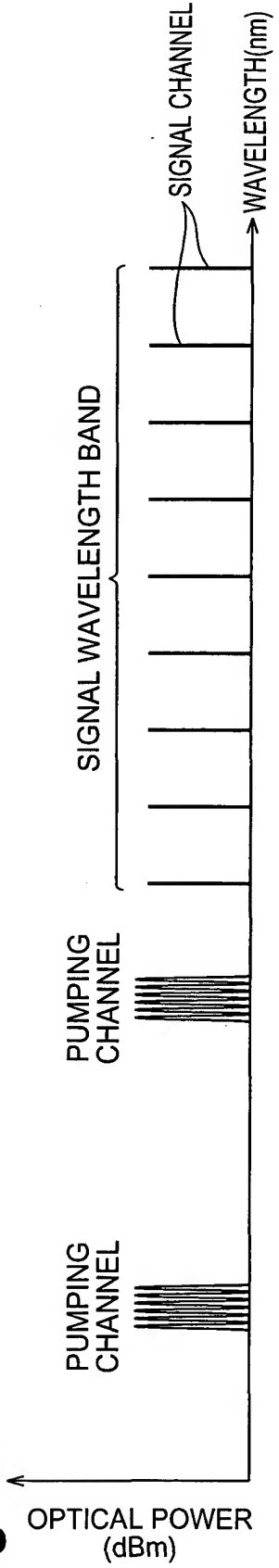
**Fig. 2A**



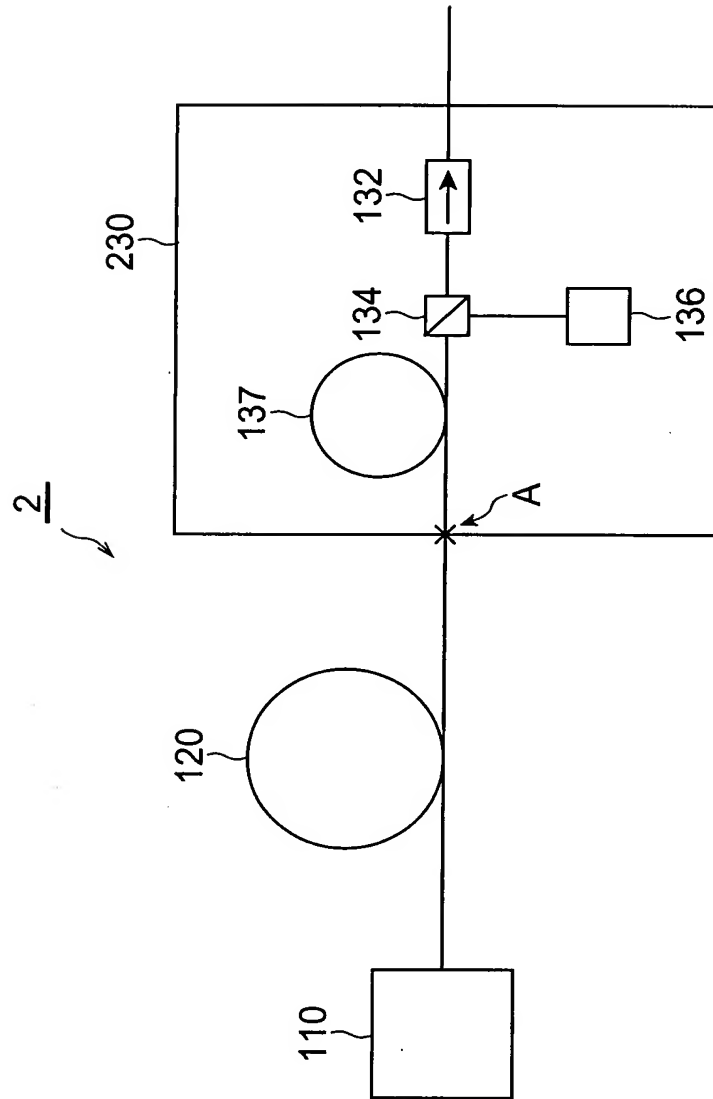
**Fig. 2B**



**Fig. 2C**

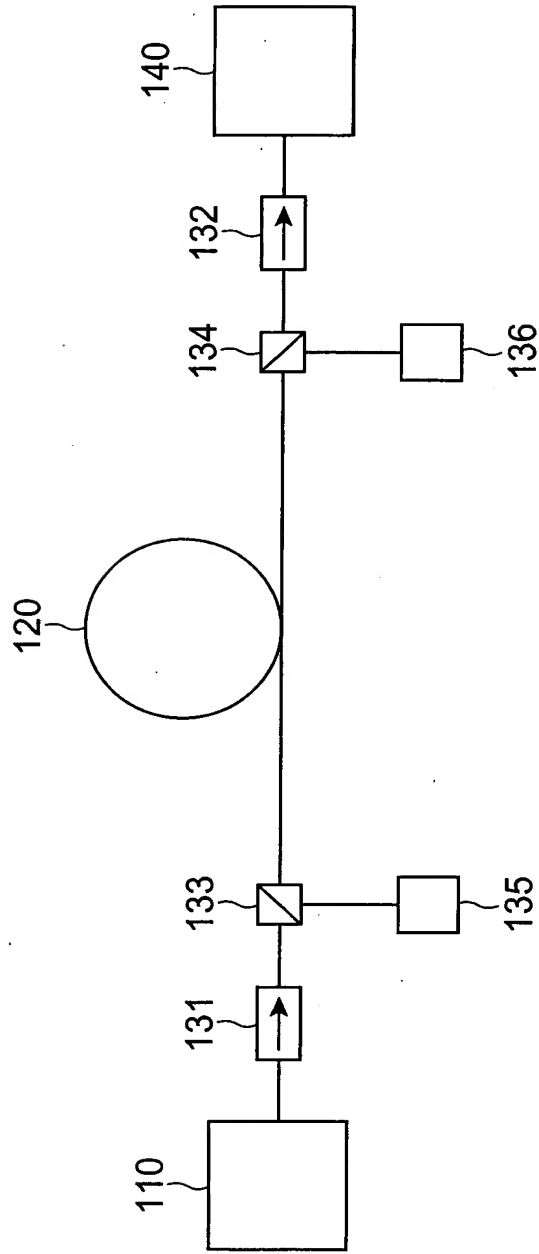


**Fig.3**

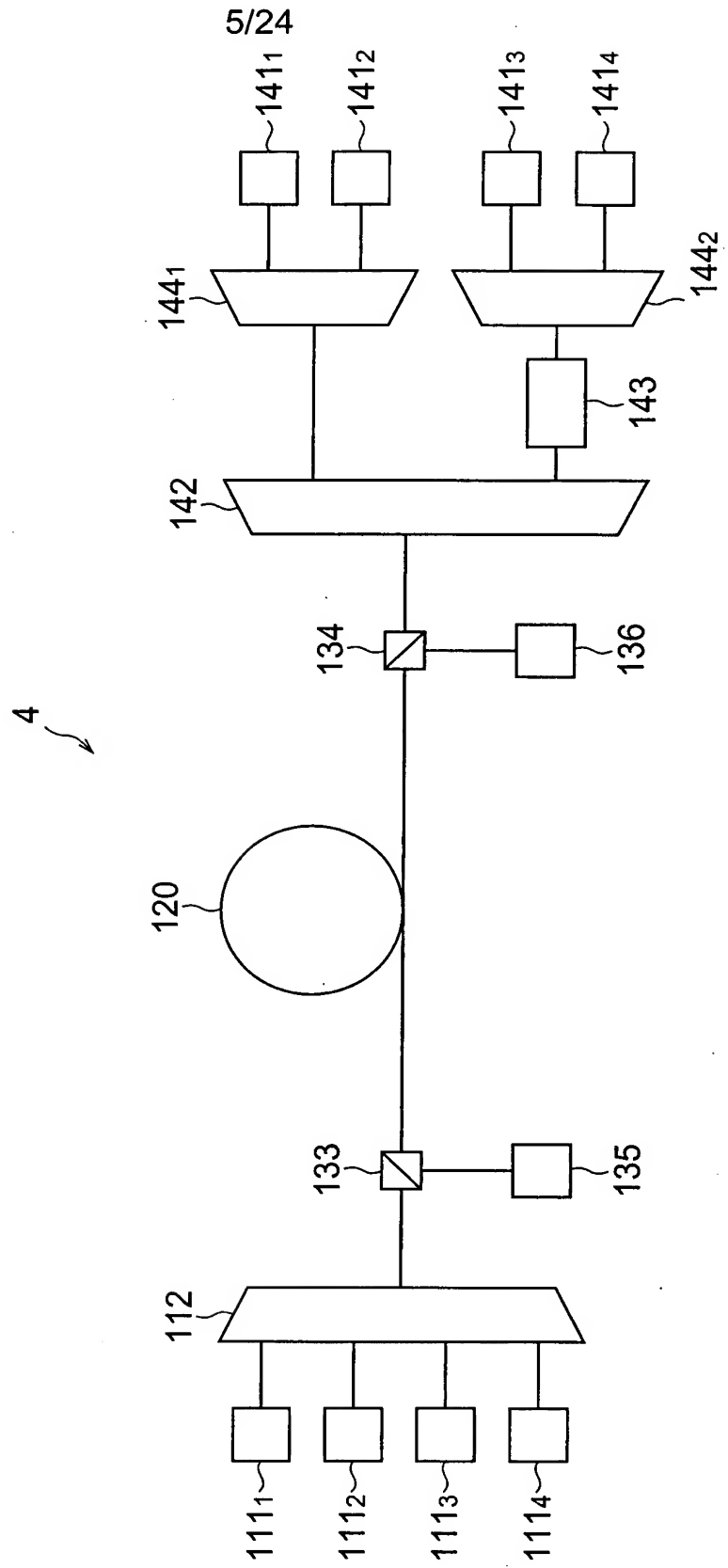


**Fig.4**

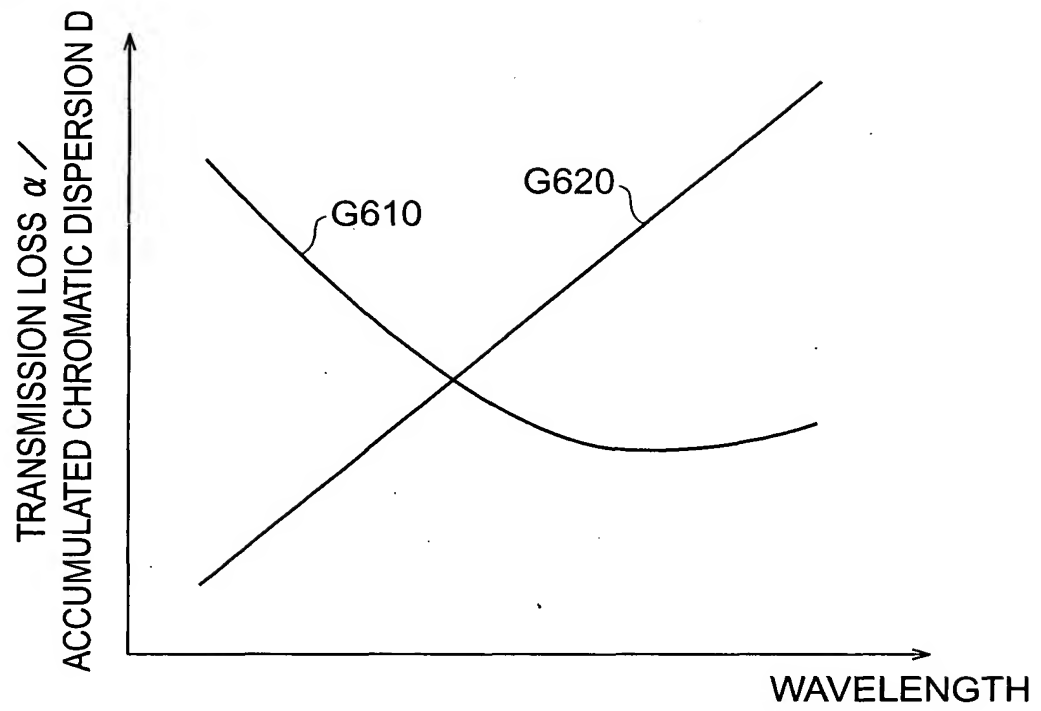
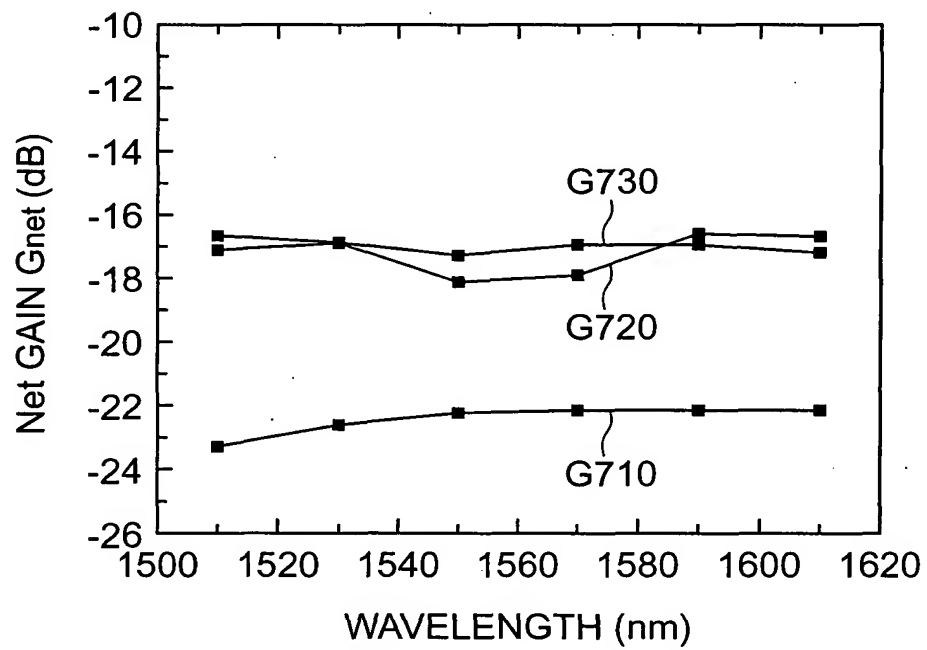
3 ↗



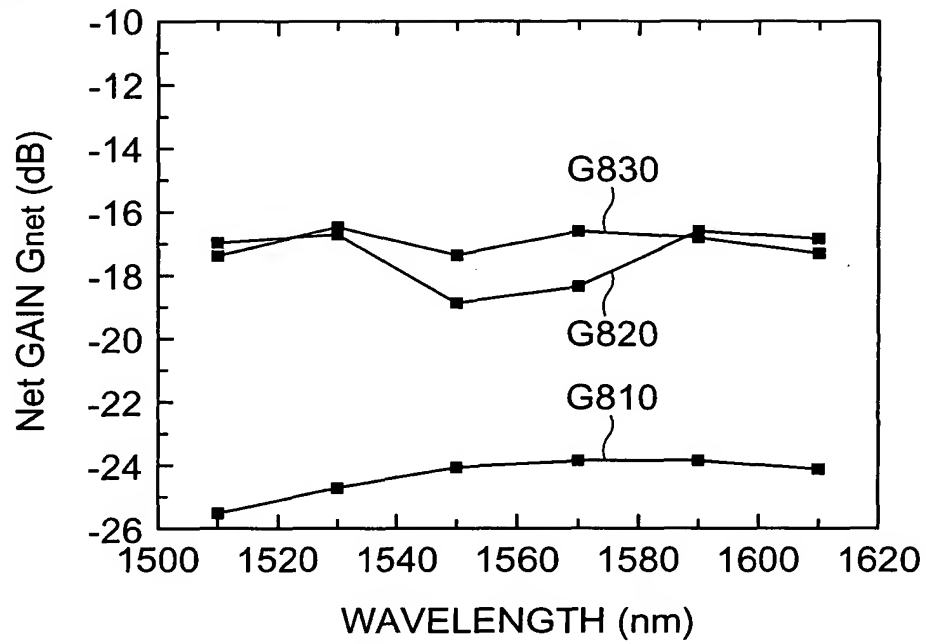
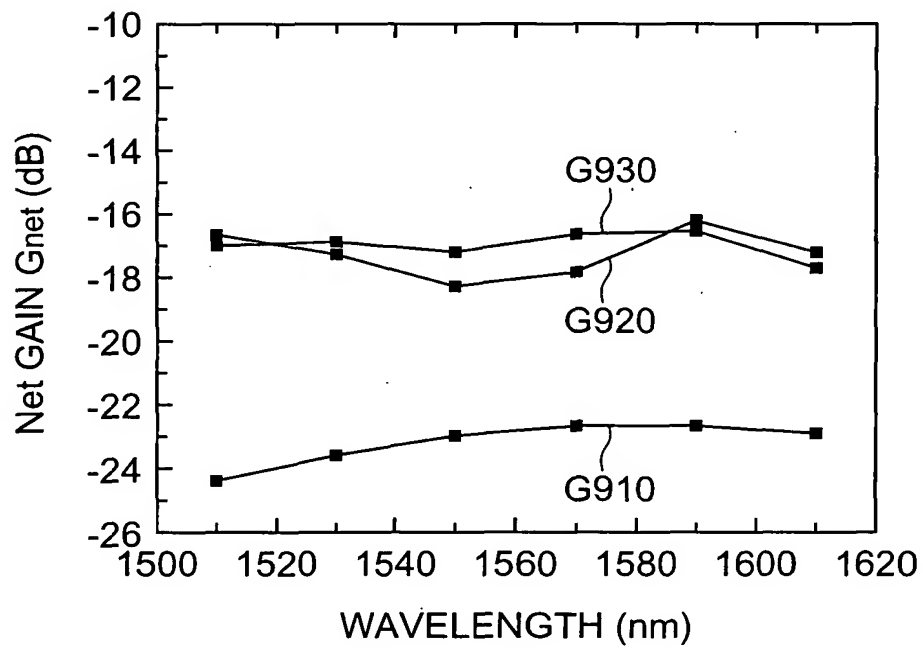
**Fig.5**



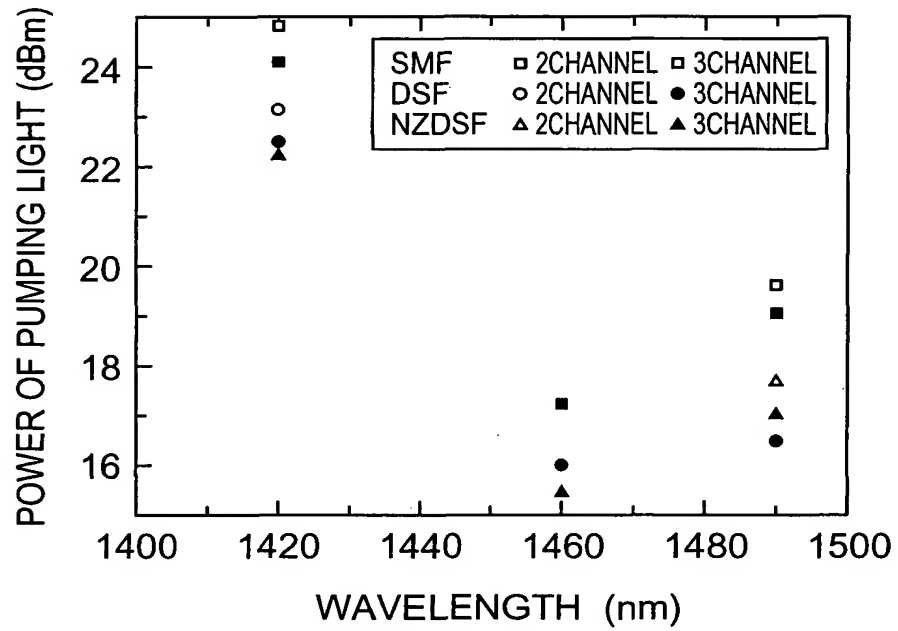
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**Fig.6****Fig.7**

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**Fig.8****Fig.9**

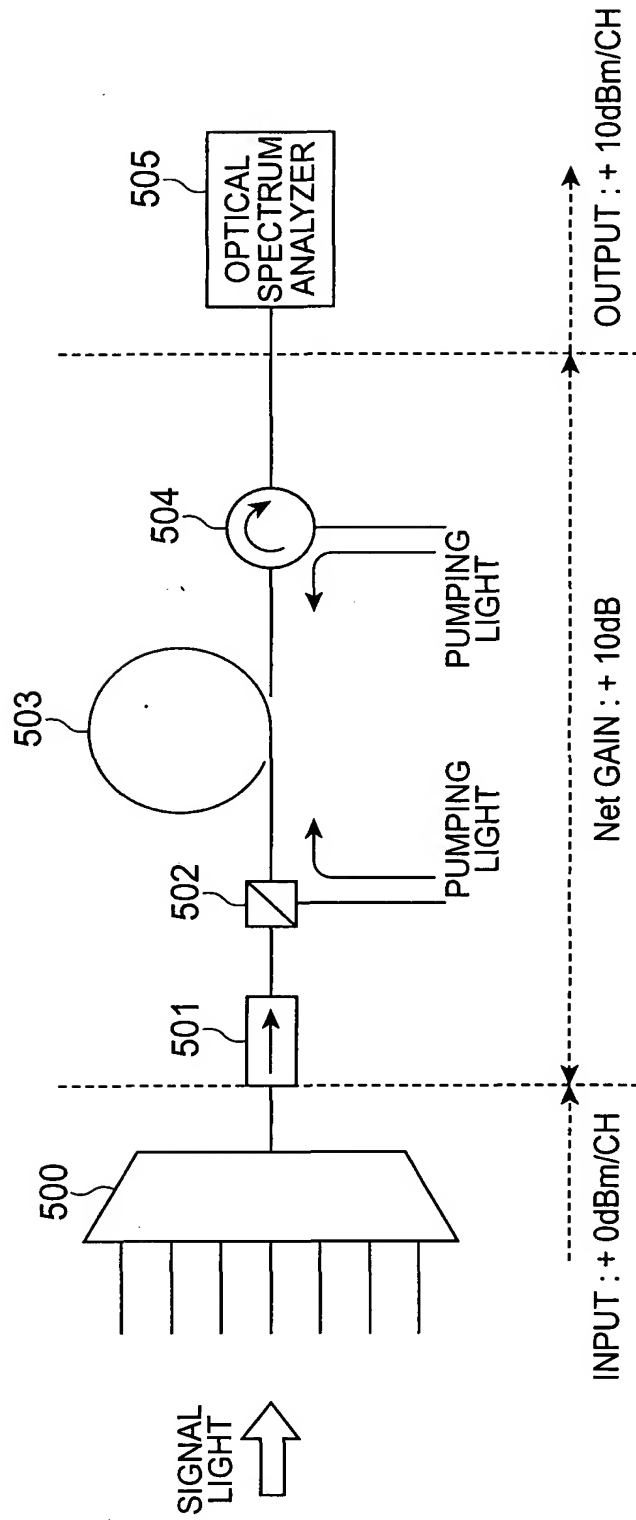
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**Fig.10**



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**Fig.11**



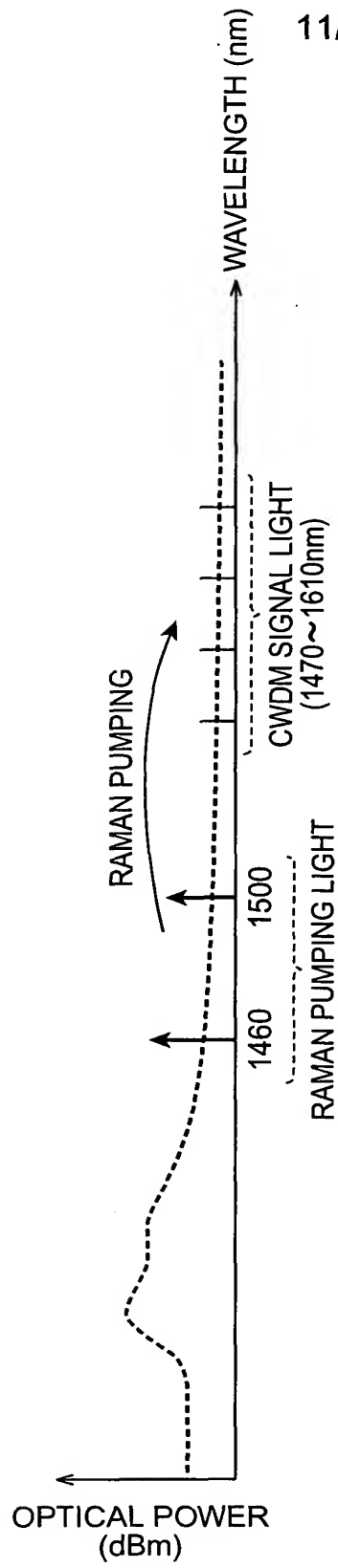
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**Fig.12**

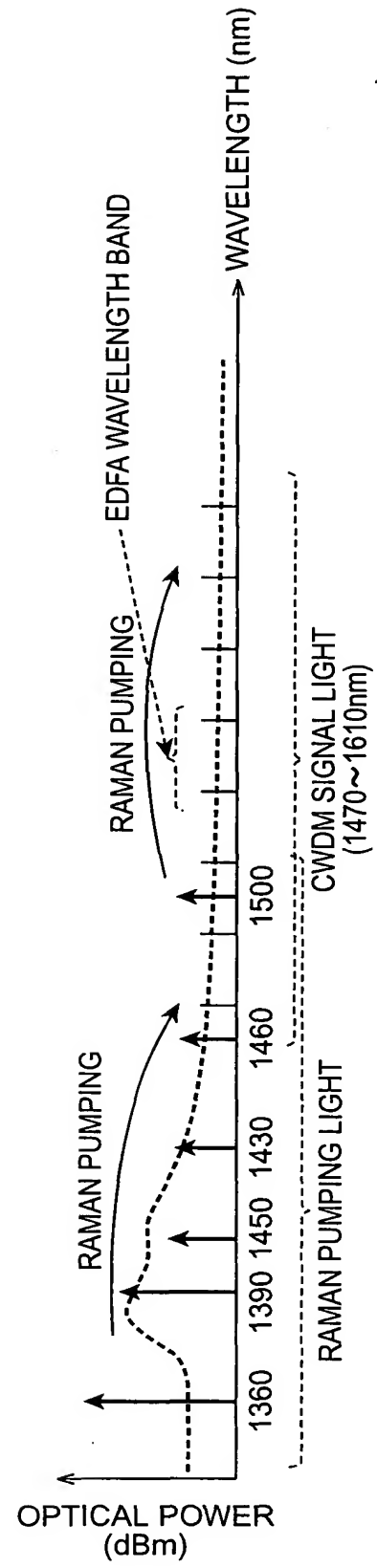
| PUMPING<br>DIRECTION | WAVELENGTH<br>(nm) | POWER (mW) |
|----------------------|--------------------|------------|
| FORWARD              | 1360               | 211.6      |
| BACKWARD             | 1360               | 613.8      |
|                      | 1390               | 235.5      |
|                      | 1405               | 11.2       |
|                      | 1430               | 11.4       |
|                      | 1460               | 6.6        |
|                      | 1500               | 23.8       |

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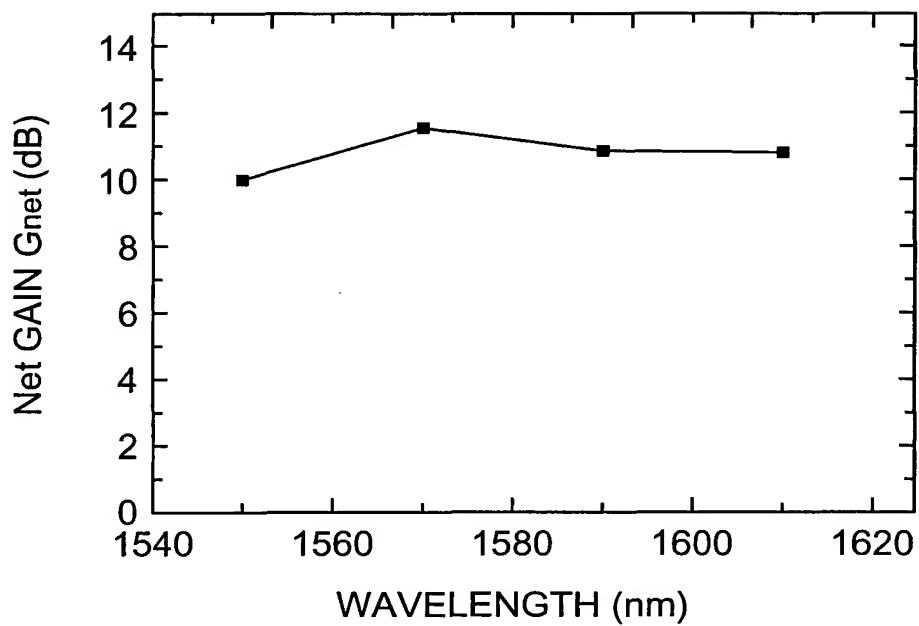
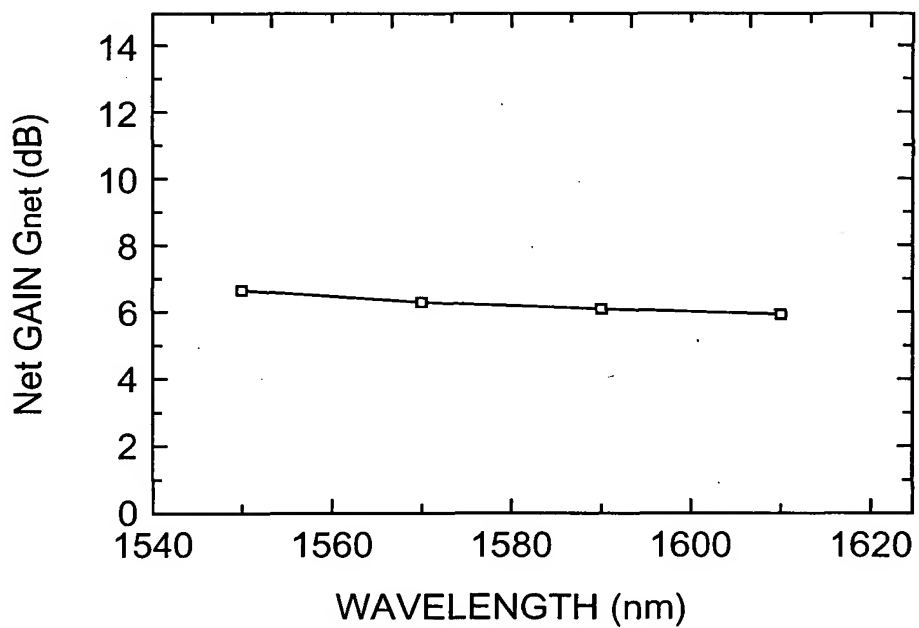
**Fig.13A**

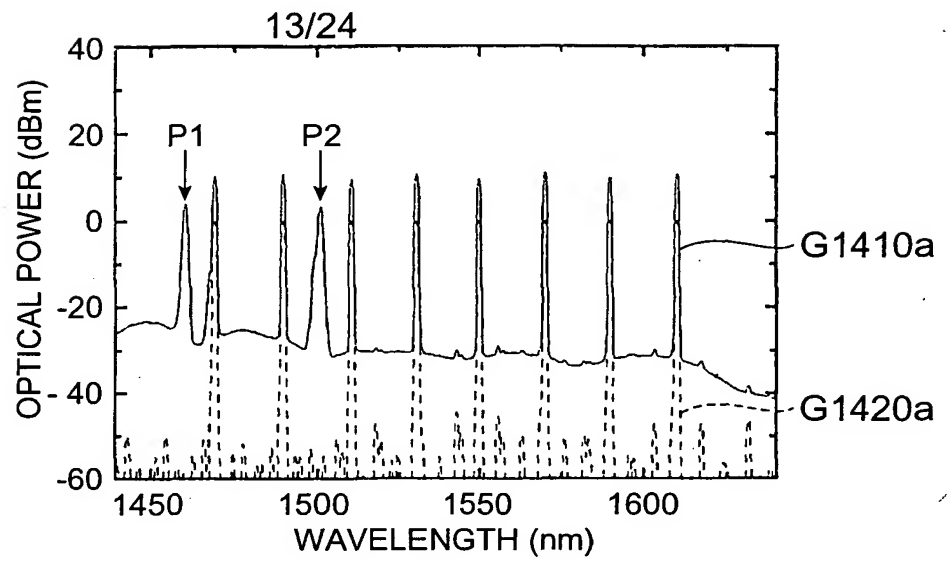
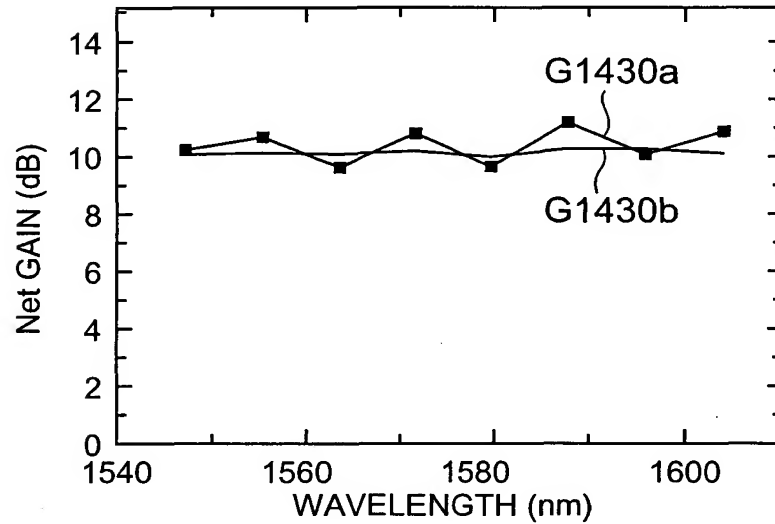
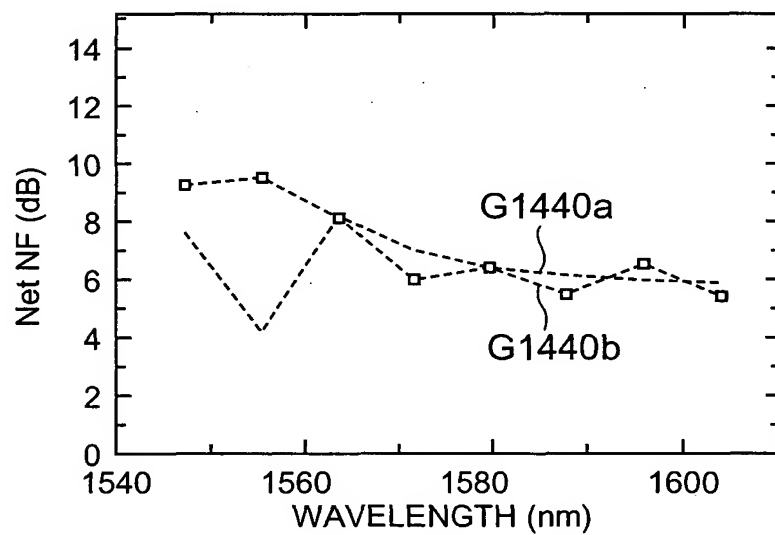


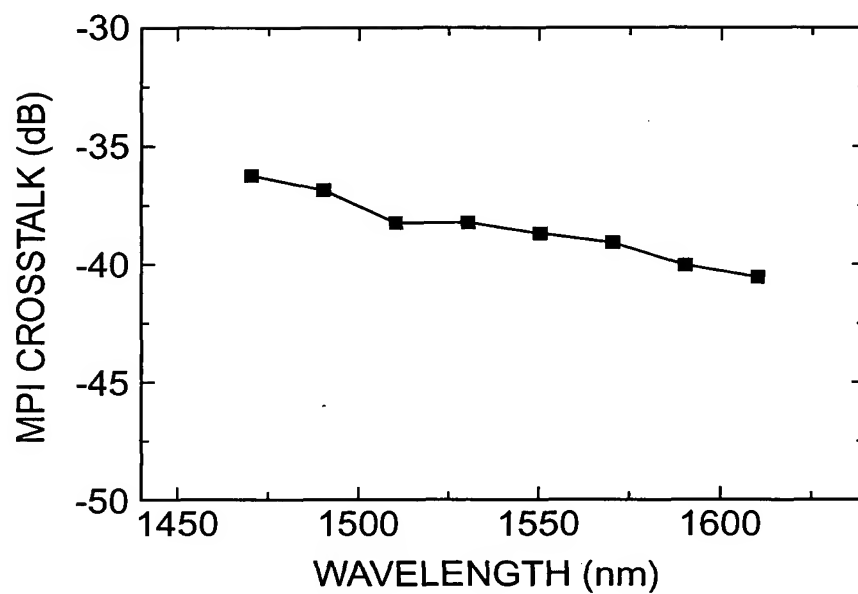
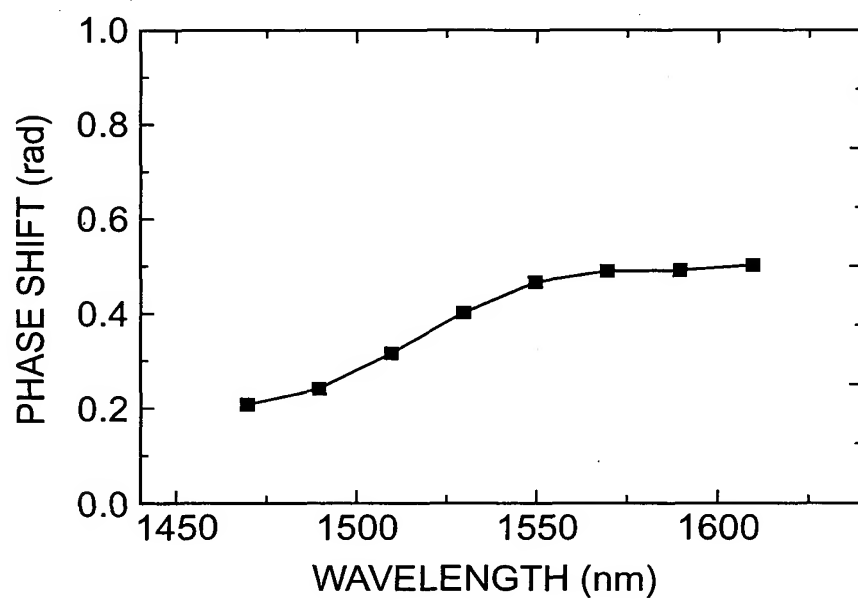
**Fig.13B**

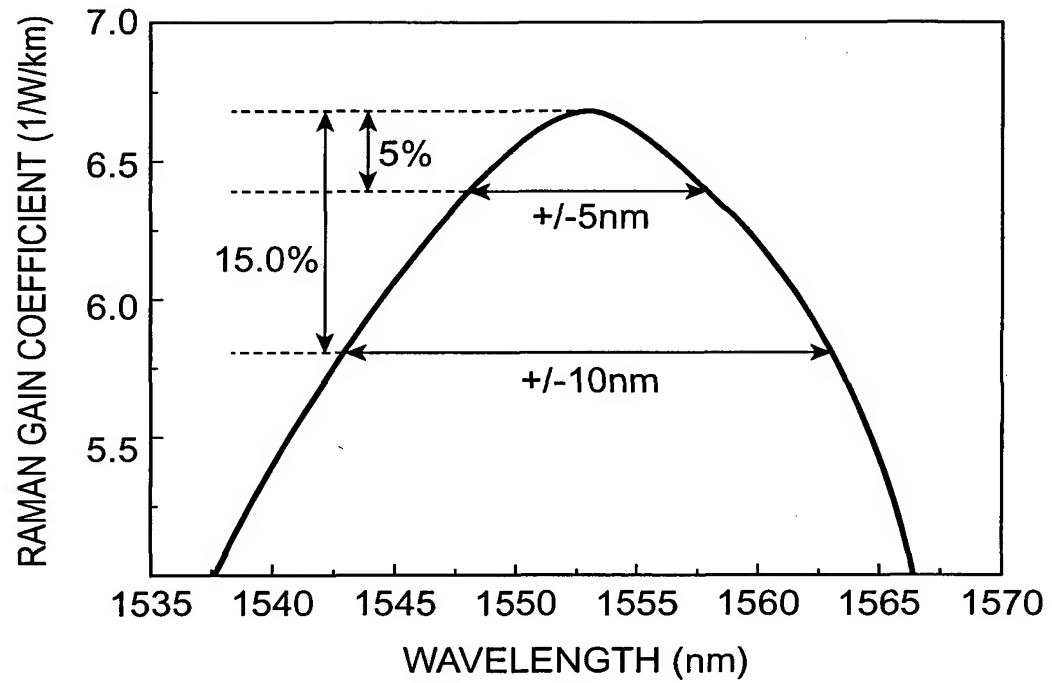


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**Fig.14A****Fig.14B**

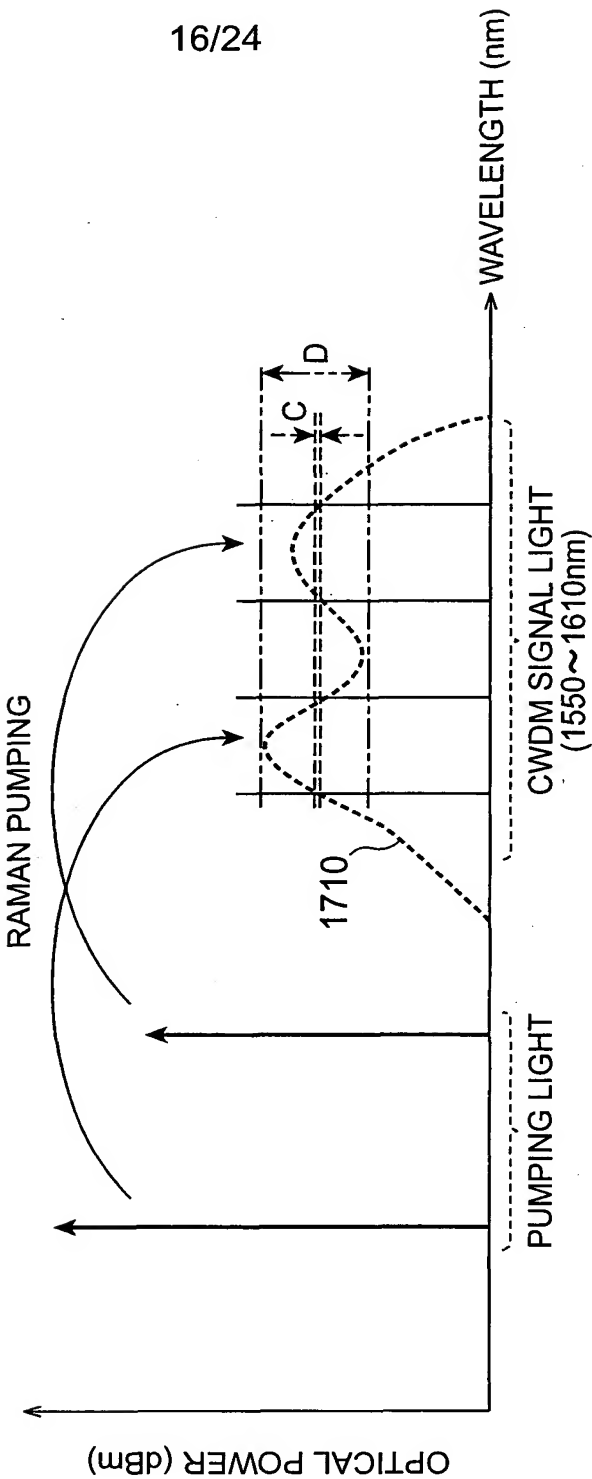
**Fig.15A****Fig.15B****Fig.15C**

**Fig.16A****Fig.16B**

**Fig.17****Fig.18**

| WAVE LENGTH OF SIGNAL LIGHT (nm)<br>(CHANNEL SPACING:20nm) | WAVELENGTH OF PUMPING LIGHT (nm) |
|--|----------------------------------|
| 1470~1530  | 1387.5,1427.5                    |
| 1550~1610  | 1457.5,1500                      |
| 1510~1570  | 1422.5,1465                      |

Fig.19





**Fig. 20**

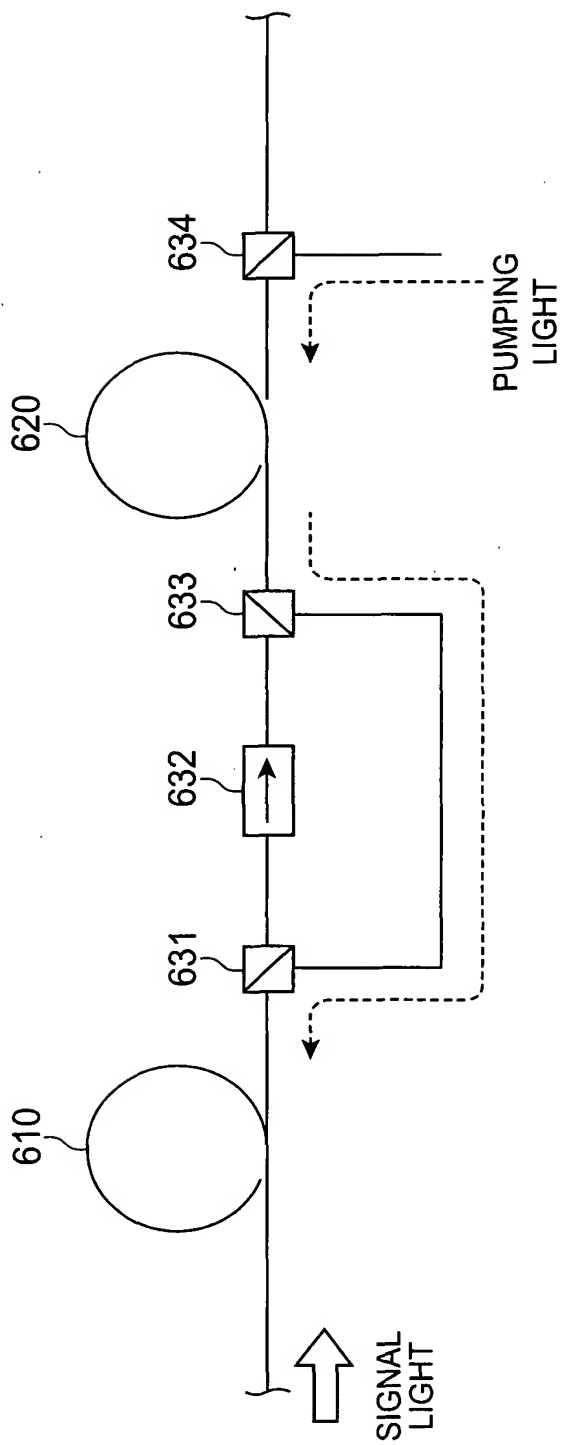


Fig.21

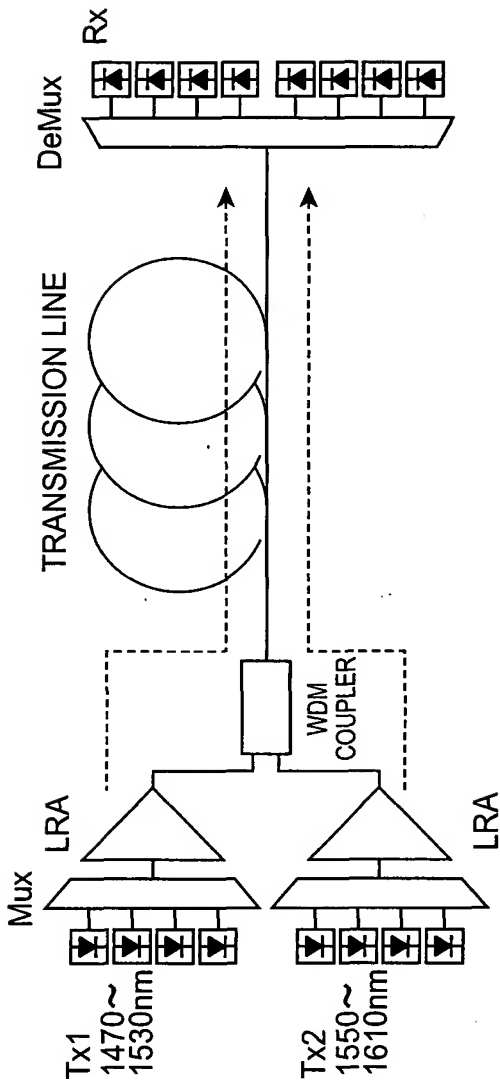


Fig.22

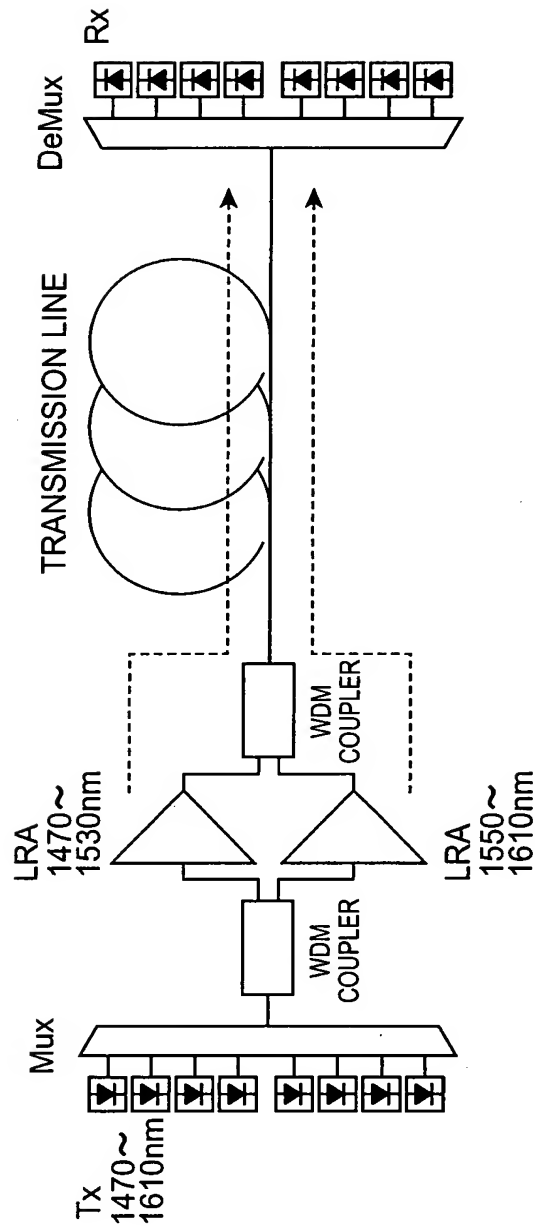


Fig.23

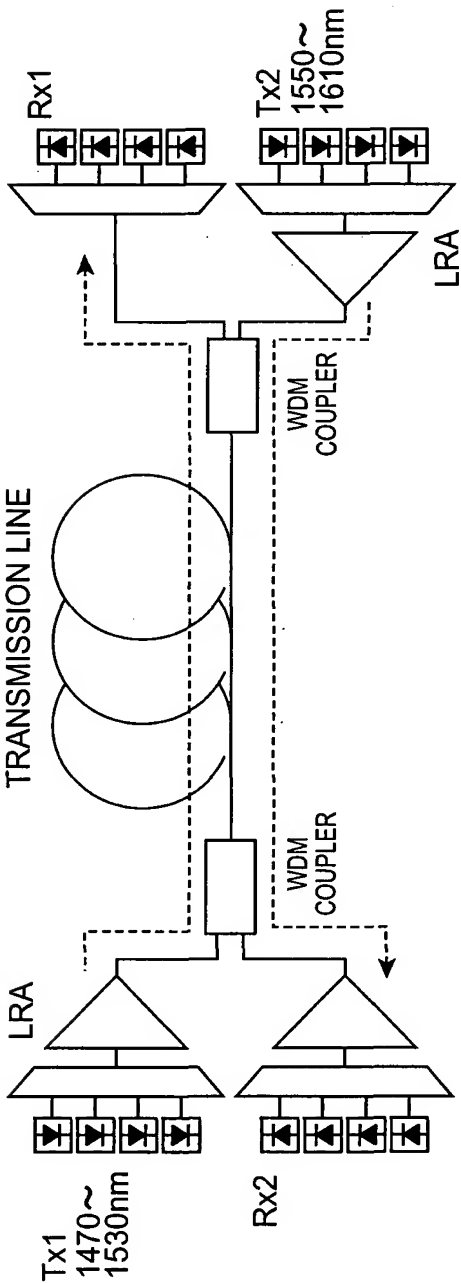


Fig.24

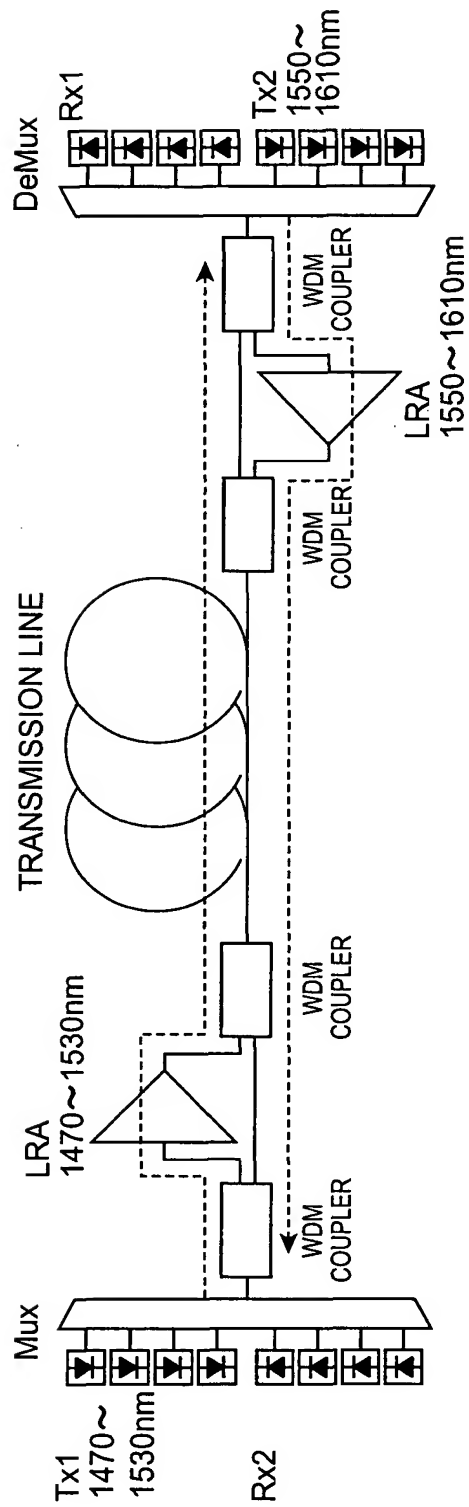
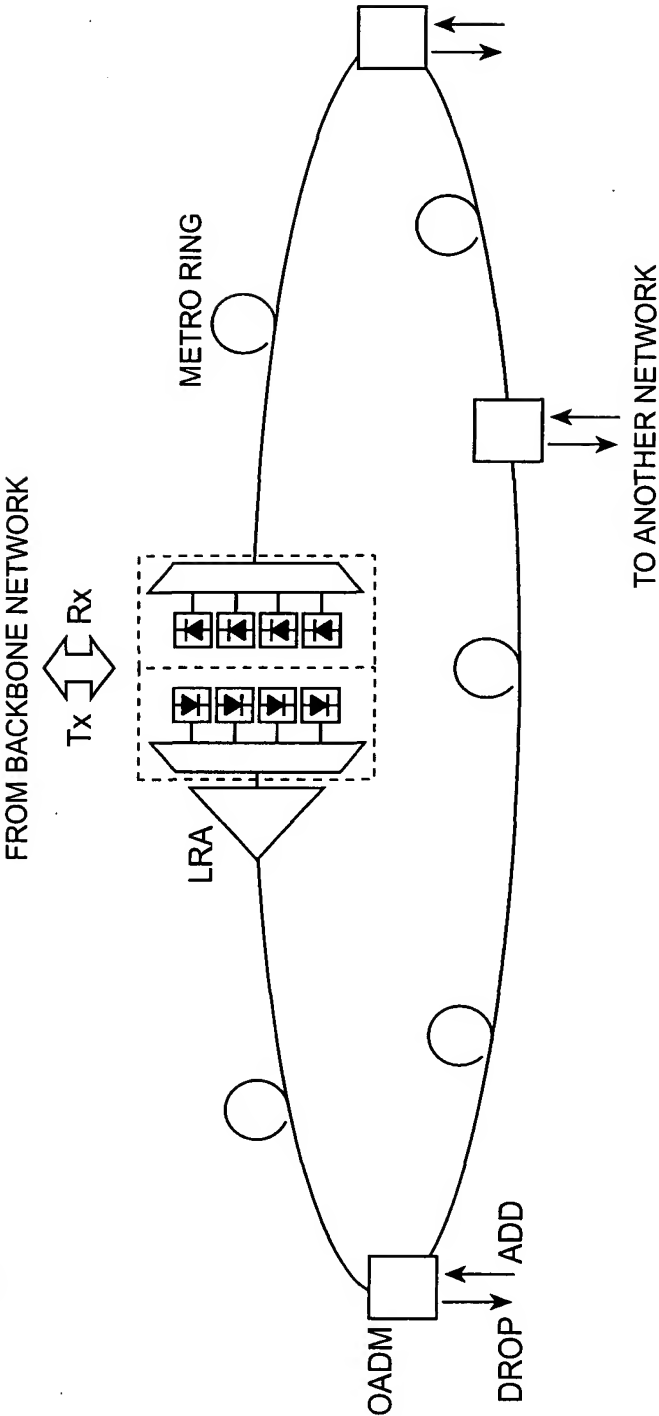
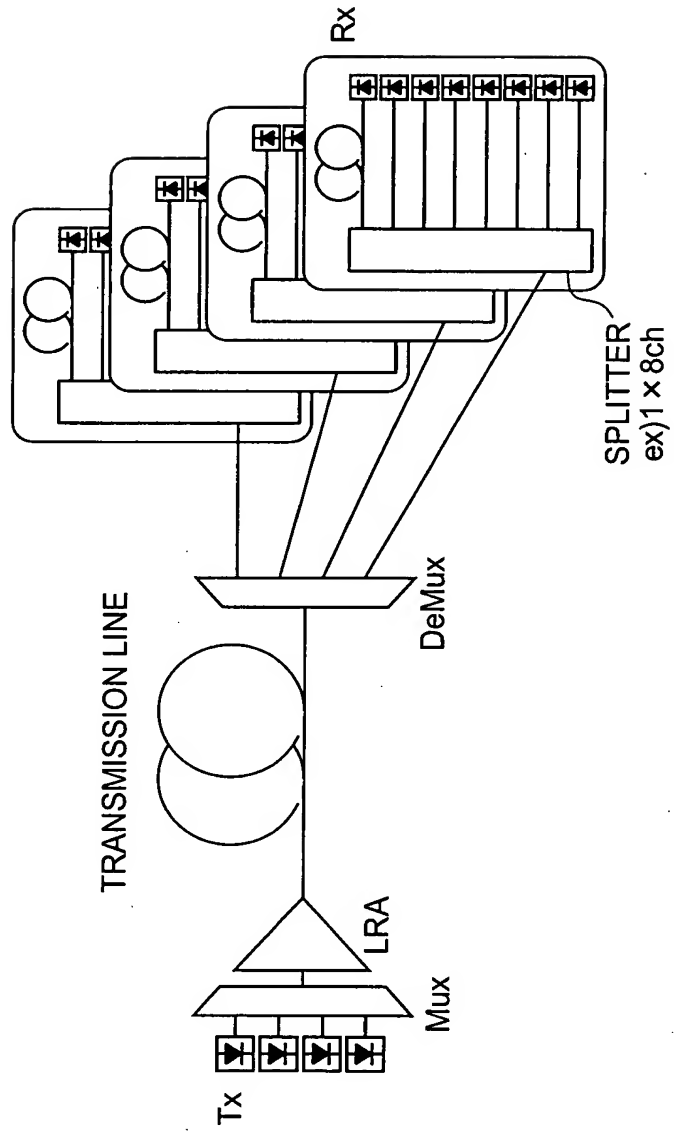


Fig.25



**Fig.26**



**Fig.27**